

1. A puncture and cut resistant material comprising:
a plurality of microspheres aggregated together; and
a polymer coating surrounding the microspheres;
wherein the polymer coating over the aggregated
5 microspheres forms a macrosphere having a substantially smooth
spherical surface.

2. The puncture and cut resistant material of claim 1
wherein the plurality of microspheres aggregated together
10 further comprises a polymer for aggregating the microspheres.

3. The puncture and cut resistant material of claim 1
wherein:
each area between adjacent microspheres and the
15 polymer coating in the area between adjacent microspheres forms
a capture device; and
wherein the plurality of microspheres and polymer
coating create a contiguous set of capture devices surrounding
the macrosphere.

20

4. The puncture and cut resistant material of claim 1
wherein:
the microspheres comprise alumina.

25 5. The puncture and cut resistant material of claim 1
wherein:
the microspheres comprise a magnetically sensitive
material.

30

6. The puncture and cut resistant material of claim 1 wherein:

each microsphere has a diameter of approximately 5 to 10 mils; and

5 each macrosphere has a diameter of approximately 20 to 60 mils.

7. The puncture and cut resistant material of claim 1 wherein:

10 the polymer comprises high density polyethylene.

8. The puncture and cut resistant material of claim 1 further comprising:

a first array of adjacent macrospheres; and
15 an elastomer encapsulating the first array of adjacent macrospheres.

9. The puncture and cut resistant material of claim 8 further comprising:

20 a second array of adjacent macrospheres overlaying the first array; and

a third array of adjacent macrospheres overlaying the second array;

25 wherein the elastomer encapsulates the first, second, and third arrays of adjacent macrospheres.

10. The puncture and cut resistant material of claim 9 wherein the elastomer encapsulated first, second, and third arrays of adjacent macrospheres form a puncture resistant
30 surgical glove.

11. A puncture and cut resistant material comprising:
5 a substantially spherical porous structure having a
porous surface with random pores; and
a polymer coating over the porous structure;
wherein the polymer coating over the porous structure
forms a macrosphere having a substantially smooth surface.

10 12. The puncture and cut resistant material of claim 11
wherein:
each random pore and the polymer coating over the
macrospheres forms a capture device;
15 wherein the capture device is adapted to capture an
invading sharp instrument.

13. The puncture and cut resistant material of claim 11
wherein:
20 the macrospheres comprise porous aluminum oxide.

14. The puncture and cut resistant material of claim 11
wherein:
the macrospheres comprise a magnetically sensitive
25 material.

15. The puncture and cut resistant material of claim 11
wherein:
each macrosphere has a diameter of approximately 60
30 to 120 mils.

16. The puncture and cut resistant material of claim 11 wherein:

the polymer comprises high density polyethylene.

5

17. The puncture and cut resistant material of claim 11 further comprising:

a first array of adjacent macrospheres;

a second array of adjacent macrospheres overlaying
10 the first array;

a third array of adjacent macrospheres overlaying the second array; and

an elastomer encapsulating the first, second, and third arrays of adjacent macrospheres.

15

18. A puncture and cut resistant surgical glove comprising:

a plurality of overlaying arrays of adjacent substantially spherical macrospheres, each macrosphere having
20 capture devices; and

an elastomer encapsulating the plurality of overlaying arrays of adjacent macrospheres.

19. The puncture and cut resistant surgical glove of
25 claim 18 wherein:

each substantially spherical macrosphere having capture devices comprises:

a plurality of microspheres aggregated together; and

30 a polymer coating over the aggregated

microspheres;

wherein the polymer coating over the aggregated microspheres forms a macrosphere having a substantially smooth surface;

5 wherein each area between adjacent microspheres and the polymer coating in the area between adjacent microspheres forms a capture device; and

wherein the plurality of microspheres and polymer coating create a contiguous set of capture devices
10 surrounding the macrosphere.

20. The puncture and cut resistant surgical glove of claim 18 wherein:

each substantially spherical macrosphere having
15 capture devices comprises:

a substantially spherical porous structure having a porous surface with random pores; and

a polymer coating over the porous structure;

wherein the polymer coating over the porous
20 structure forms a substantially smooth surface on the macrosphere.

21. The puncture and cut resistant surgical glove of claim 18 wherein:

25 each macrosphere has a diameter of approximately 20 to 120 mils.

22. The puncture and cut resistant surgical glove of claim 18 wherein:

30 each macrosphere comprises a magnetically

sensitive material.

23. A method of producing a puncture and cut resistant material comprising the steps of:

5 forming macrospheres, each macrosphere having capture devices; and

 injecting the macrospheres and an elastomer into an injection mold.

10 24. The method of claim 23 for producing a puncture and cut resistant material wherein the steps of forming macrospheres, each macrosphere having capture devices comprises the steps of:

 spraying droplets of molten alumina;

15 cooling the droplets to form microspheres;

 spraying a droplets of a solution of microspheres and liquefied polyethylene;

 cooling the droplets to form macrospheres, each macrosphere comprising aggregated microspheres coated with
20 polyethylene.

25 25. The method of claim 23 for producing a puncture and cut resistant material wherein the steps of forming macrospheres, each macrosphere having capture devices comprises the steps of:

 spraying droplets of molten alumina and a second material that volatizes at a lower temperature than the alumina;

 cooling the droplets to form porous macrospheres;

30 spraying a droplets of a solution of macrospheres and

liquefied polyethylene;

cooling the droplets to form polyethylene coated
macrospheres.

5

26. A method of producing a puncture and cut resistant
material comprising the steps of:

forming magnetically sensitive macrospheres, each
macrosphere having capture devices;

10 dipping a former comprising electro-magnetic elements
into a solution of the magnetically sensitive macrospheres and
an elastomer; and

activating the electro-magnetic elements;

whereby activating the electro-magnetic elements
15 draws the magnetically sensitive macrospheres onto surfaces of
the former.

27. The method of claim 26 for producing a puncture and
cut resistant material wherein the steps of forming
20 magnetically sensitive macrospheres, each macrosphere
having capture devices comprises the steps of:

spraying droplets of molten alumina comprising a
magnetically sensitive material;

cooling the droplets to form microspheres;

25 spraying a droplets of a solution of microspheres and
liquefied polyethylene;

cooling the droplets to form macrospheres, each
macrosphere comprising aggregated microspheres coated with
polyethylene.

30

28. The method of claim 26 for producing a puncture and cut resistant material wherein the steps of forming macrospheres, each macrosphere having capture devices comprises the steps of:

5 spraying droplets of molten alumina comprising a magnetically sensitive material and a second material that volatilizes at a lower temperature than the alumina;

cooling the droplets to form porous macrospheres;

10 spraying a droplets of a solution of macrospheres and liquefied polyethylene;

cooling the droplets to form polyethylene coated macrospheres.